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(54) Actuation of locking members of spreader.

(57) A spreader is used for coupling and hoisting of a container. The spreader has on the corner points locking members 7 for connection to matching openings 6 in the container. The locking members are actuated with a rotatable control lever 8 which can move between two end positions and is coupled with an actuating mechanism 9. As the spreader is lowered on to container 2, control lever 8, coupled to a hoisting cable, falls under its own weight so as to pivot members 16, 17; this latter rotates member 14 and connected rod 13, which in turn rotates locking members 7 and cams 20 approach slots 21 in release pins 22. Because member 18 interferes with a mirror-image fork (not shown) on member 14, device 15 and rod 13 cannot complete their rotation until control lever 8 is lifted, and with it member 18; an over-centre spring 19 then snaps over device 15 and completes the rotation of rod 13 and locking members 7. If locking members 7 are not correctly in register with slots 6, control lever 8 cannot reach its end-position and this is observed by the operator. Control lever 8 can be disabled by lock 26, and rod 13 rotated manually by lever 25.

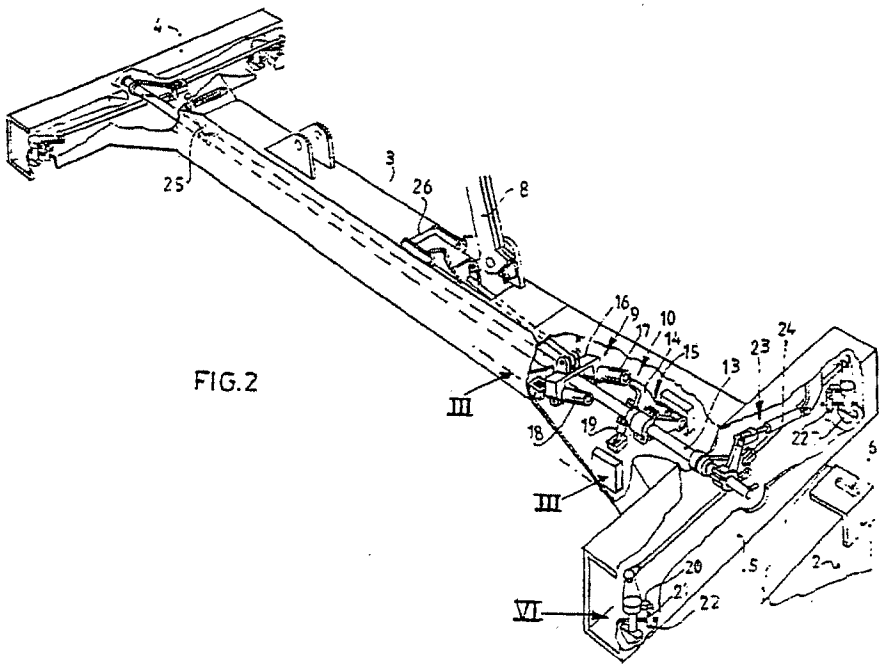

FIG.2

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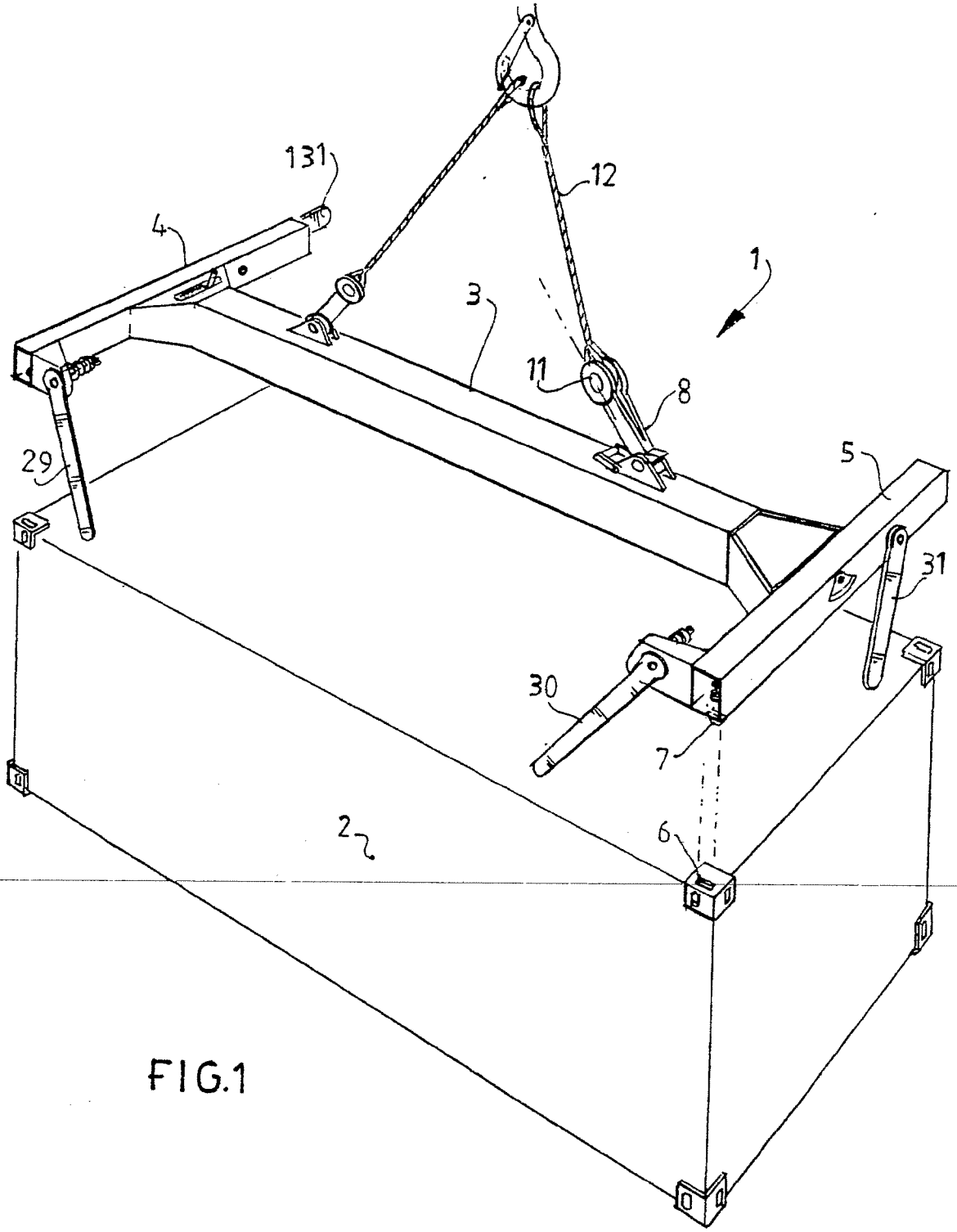

FIG.1

AD

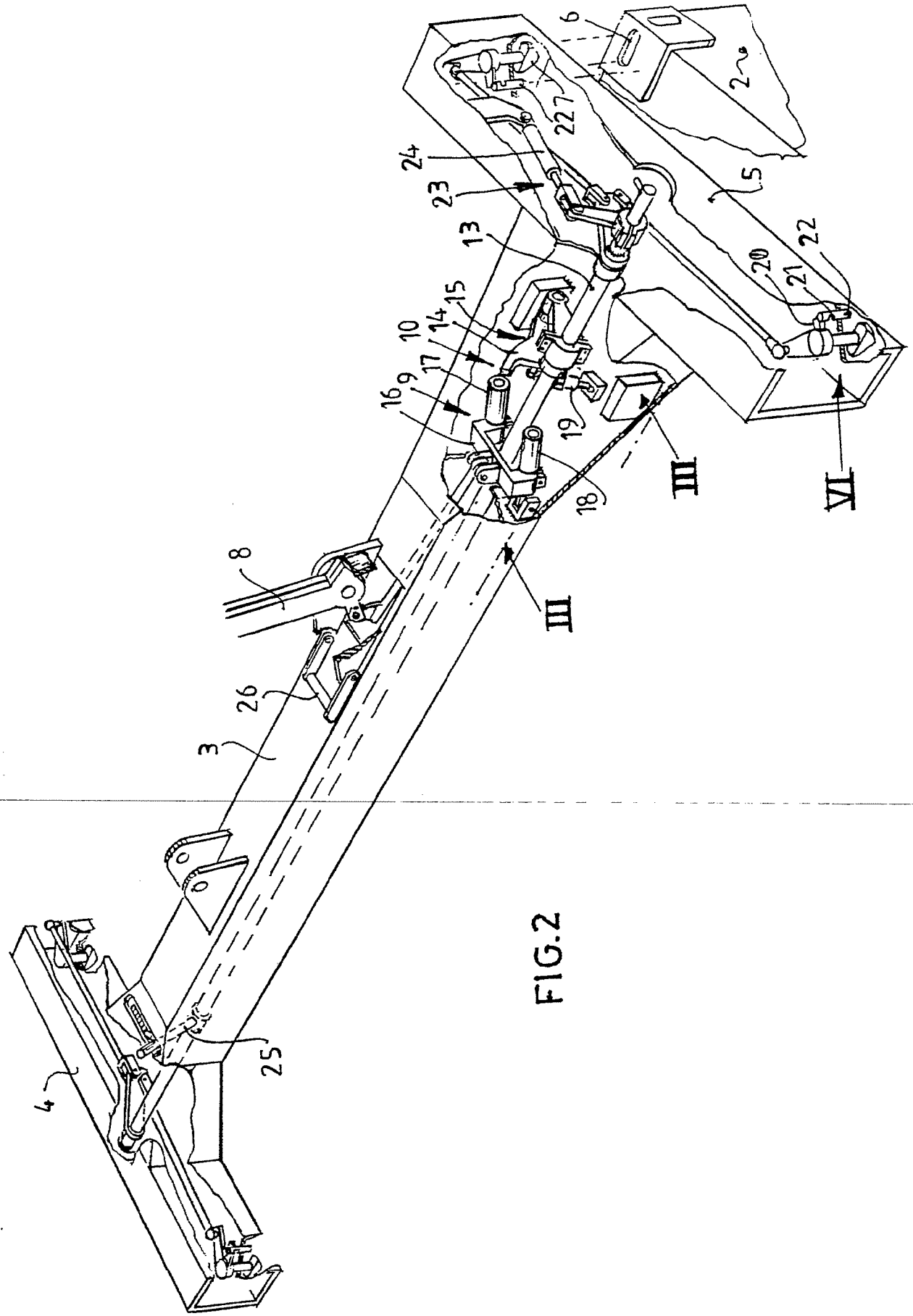

FIG.2

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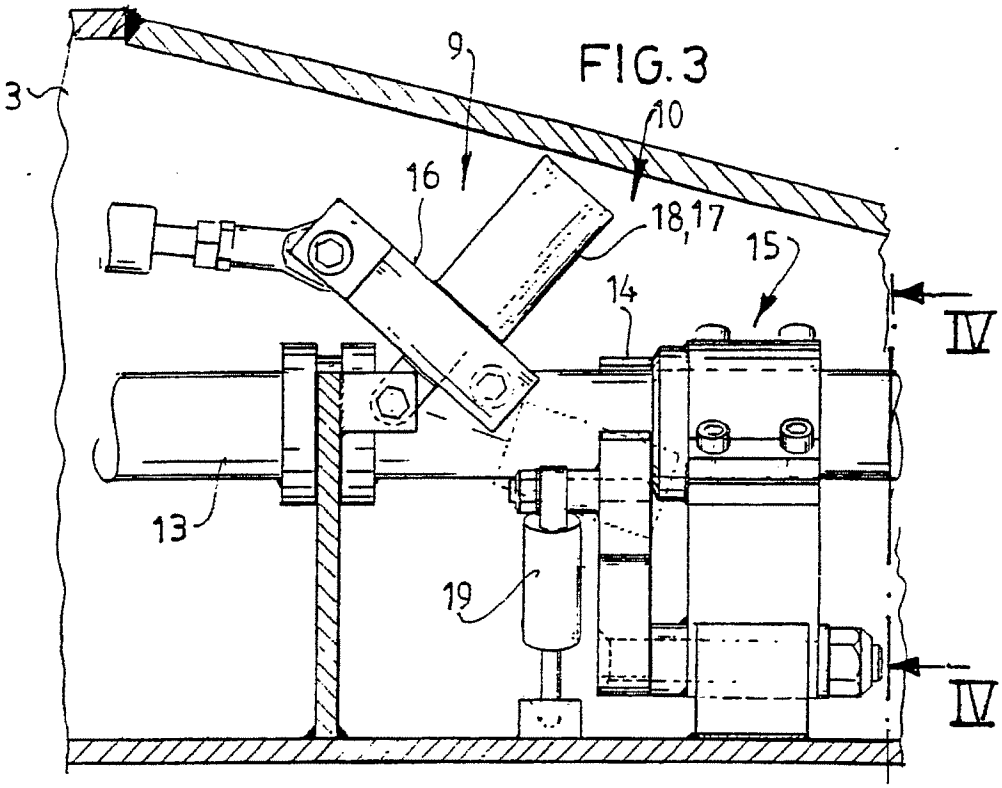

FIG.3

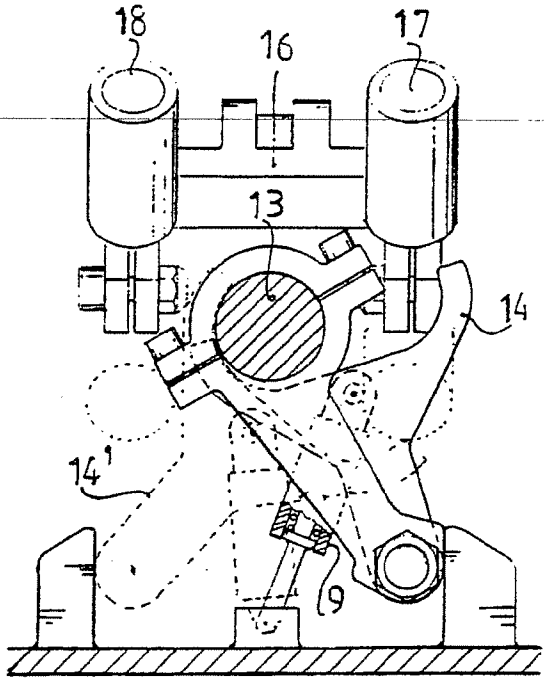

FIG.4

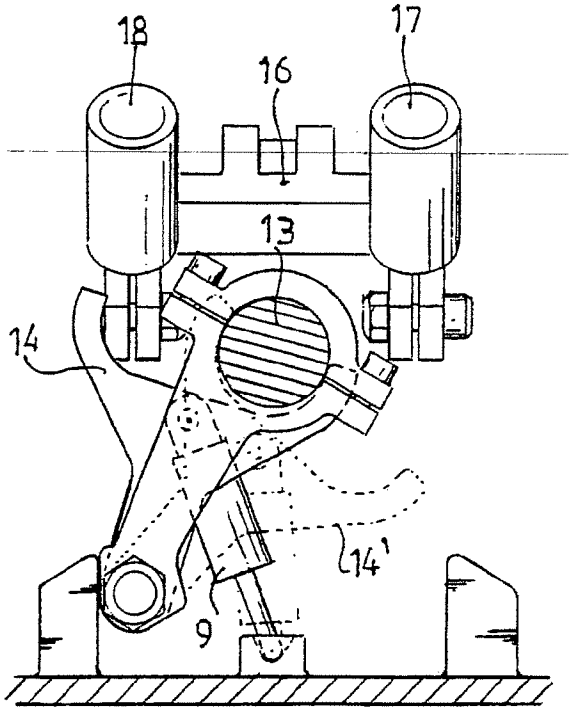

FIG.5

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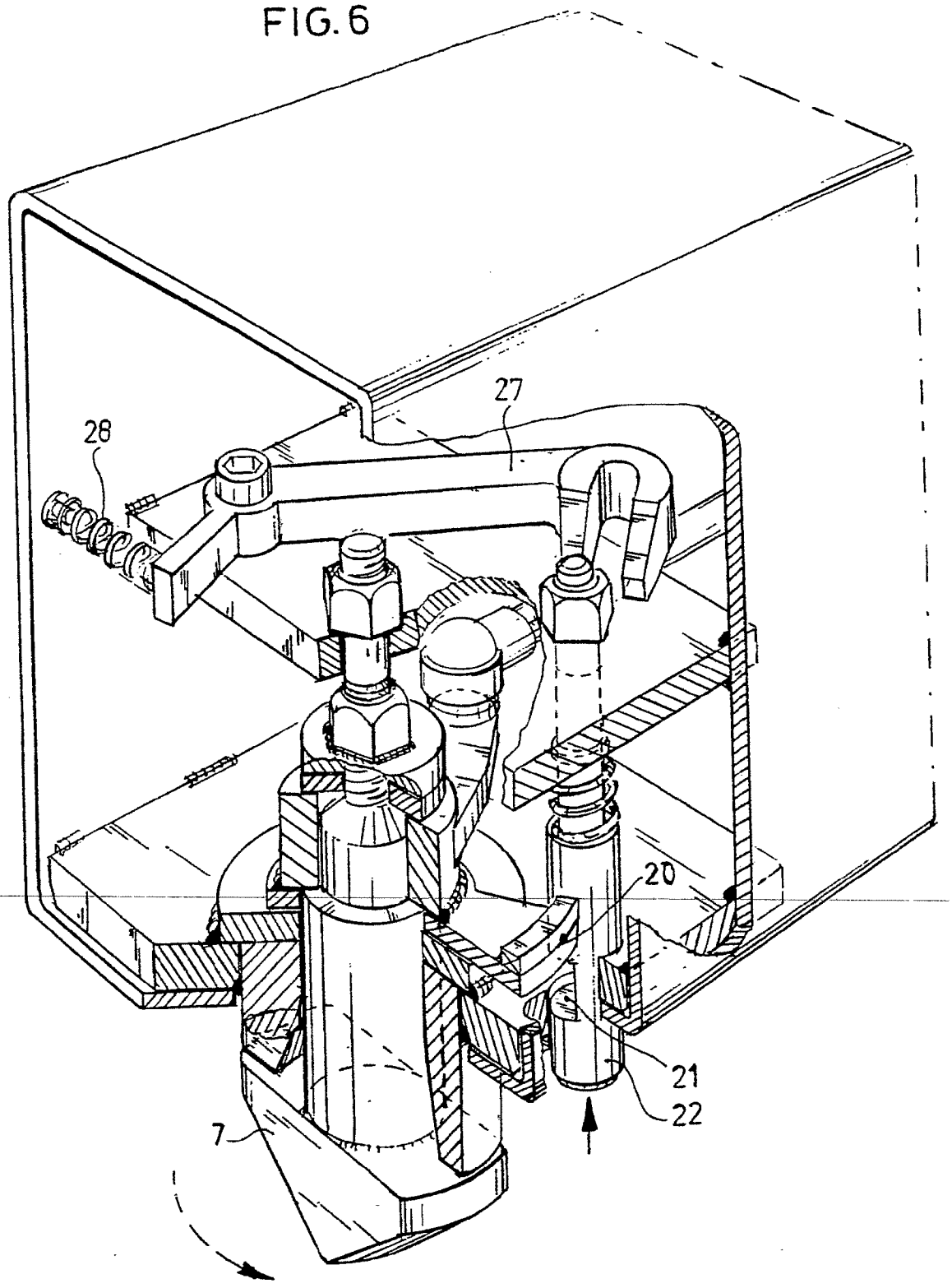
FIG.6



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HOISTING FRAME

The invention relates to a hoisting frame for the gripping of, coupling with and hoisting of a container, consisting of at least one longitudinal beam and at least two transverse beams with downward directed locking members on the end portions of the transverse beams, which members are lockable through rotation onto matching openings in the container, and an actuating mechanism for actuating the locking members coupled with a control lever rotatable between two end positions and a coupling device accommodated in the actuating mechanism and acting in one direction, such that the rotation of the locking member in each direction occurs on a movement of the control lever towards one particular end position.

Such a hoisting frame, called a spreader in the trade, is used for hoisting containers. In use, the known hoisting frame is lowered onto a container to be lifted and is positioned by an operator such that the locking members fall into the openings in the container intended for that purpose. The operator subsequently secures the locking members and the container can be hoisted. A hoisting frame of this type is known from DE-A-28 03 935.

Complex and therefore expensive fully automatic hoisting frames are known, whereby the hoisting frame is automatically lowered onto the container and subsequently locked using for example infra-red control members. Such cranes and hoisting frames are erected on the wharf in larger, well-equipped harbours and are only economical in application if large quantities of containers have to be dealt with.

In less well-equipped harbours, such as are to be found in developing countries for example, hoisting facilities

are often lacking in the harbour in question. In practice the container is therefore hoisted out of the hold of the ship or placed therein with the type of frame mentioned in the preamble using a crane present on board ship.

A drawback to the known hoisting frame is that no clear visual control performable at a distance is possible in the operation of the locking members. Should one or several of the locking members be not at all or incorrectly coupled to the container then the operator cannot observe this. The control lever is pulled upward and the possible resistance which the locking members experience as a result of incorrect coupling to a container is overcome by the force with which the control lever is pulled. When the control lever has reached the end position and the incorrectly coupled container is lifted up considerable damage can occur, since it will come to hang at a slant or some similar disaster.

The object of the invention is to find a solution for this, such that only when the frame is coupled to the container in the correct manner, which can be visually observed by the operator, can the hoisting operation take place.

This is achieved according to the invention in that this particular end position is reached under the influence of the weight of the rotatable lever itself.

Because the control lever moves to the active end position through its own weight and therefore the energy needed for coupling is derived, at least over the first part of the stroke, from the weight of the control lever, the end position of the control lever is achieved as a result of the positive coupling only when coupling has taken place in the correct manner. Should the locking members thereby encounter strong resistance then the control lever will not be able to move any further downward, which is observed by the operator. The operator will therefore move the control lever back, as a result of which the locking members will arrive in a non-coupling position and he will subsequently repeat the coupling

attempt by once again trying to cause the control lever to move downward under its own weight.

Because of the solution according to the invention it is possible for the hoisting cable to be attached to the control lever. Since the return stroke, i.e. to the raised position of the control lever, is the loose stroke and in the raised end position the lever assumes the inactive position, the lever can serve in this position as attachment point for the hoisting cable and the container can be lifted on this lever.

The control lever preferably displays an attachment point for the hoisting cable.

In this manner the operator of the hoisting crane can manoeuvre the hoisting frame to the container for lifting, lower it thereon and by slackening the hoisting cable allow the control lever to move to the active end position. After reaching the end position, which can be easily seen by the operator at a distance, the control lever can be moved to the other end position by tensioning the hoisting cable. After reaching the end position the container is raised by further drawing up the hoisting cable.

The coupling device is preferably a positive coupling between the control lever and the locking members, such that the control lever only reaches the one end position when the locking members are rotated into their locking position. This has the result of preventing only a limited number of the locking members being locked onto the container for lifting, which could result in damage during hoisting. The coupling device preferably consists of a reversing mechanism having a forked member and coupled with a rotation actuating rod for the locking members, which mechanism co-acts with a rotatable fork-shaped member which is driven by the control lever and of which one of the teeth when rotated in one direction grips the forked member and causes it to rotate and of which the other tooth when rotated in the same direction causes the forked member to rotate in the other direction.

The forked member is preferably under bias of a bistable spring mechanism.

To each locking member is preferably connected a cam which co-acts with a release pin arranged for vertical movement and displaying a slot for receiving the cam, such that the slot is situated at the same height as the cam only in the highest position of the release pin.

The release pin according to this construction is moved in a vertical sense when for example it meets with the part adjoining the opening in the container. Only when the release pin is moved the required distance in vertical direction is the locking member released for rotation. Since the locking members are coupled in positive manner to the control lever and the control lever can therefore only reach the one end position when all locking members are rotated to the locking position, the operator can observe when the end position of the control lever has been reached that the locking members are all in locking connection with the container. When this is not the case for one or more locking members it is impossible for the control lever to reach the one end position. This can be visually observed at a distance so that the operator will again tension the hoisting cable and cause it to rise up and will subsequently undertake a new attempt at locking.

A bistable spring system is preferably arranged in the actuating mechanism. This spring system can comprise a gas spring. A manual control lever is connected to the rotation actuating rod for manual operation. In order to switch to manual operation the control lever is blocked using a locking member.

It is possible to secure the release pin in the highest position using a spring tensioned locking member.

The invention will be further elucidated with reference to an embodiment. In the drawings:

Fig. 1 shows a perspective view of a container with the hoisting frame according to the invention,

Fig. 2 shows a perspective view in cut away form of the hoisting frame according to the invention,

Fig. 3 is a sectional view along the line III-III in fig. 2,

Fig. 4 is a sectional view along the line IV-IV in fig. 3,

Fig. 5 shows a view similar to that in fig. 4 with the reversing mechanism in the other end position, and

Fig. 6 is a perspective view according to the arrow VI in fig. 2.

The hoisting frame 1 for gripping, coupling with and hoisting a container 2 is formed by the longitudinal beam 3 and two transverse beams 4 and 5 at the end of the longitudinal beam 3. Arranged on the ends of the transverse beams 4, 5 are wings 29, 30, 31 and 131 which in the drawn position can guide the frame 1 to a position above the container 2. The container has at the corner points a number of openings, for example 6. When the hoisting cable 12 is slackened the frame 1 descends onto the container and the locking members, for example 7, fall, when correctly positioned, into the associated opening 6. Placed close to each locking member 7 is a release pin, for example 22. When the hoisting frame is correctly placed on the container the release pin is moved vertically upwards and brought into a position whereby, through rotation of the locking member 7, the cam 20 arranged thereon can be positioned in the slot 21 in the release pin 22. The control lever 8 is coupled with the locking members 7 via the actuating mechanism 9. Arranged in the actuating mechanism 9 is a coupling device 10 acting in one direction. The coupling device 10 consists of a reversing mechanism 15 with a rotation actuating rod 13 for the locking members 7. The reversing mechanism 15 comprises a forked member 14 which can pivot between the one end position as in fig. 4 and the other end position as according to fig. 5. When the control lever 8 is moved downward the fork 16 is rotated such that the tooth 17 comes into contact with the forked member 14 and

this moves to the position indicated with dotted lines in fig. 5 counter to the action of the spring 19. As a result of the pivoting movement of the forked member 14 the rotation actuating rod 13 rotates and the locking members 7 rotate to the locking position if the release pin 22 has released the locking member 7 in the manner described above. The last part of this movement is furthered by the bistable spring system 23 of which the gas spring 24 forms a part. The reversing mechanism 15 likewise contains a bistable spring system 23 wherein the pressure spring 19 is arranged. At the end of the above described movement the reversing mechanism 15 is in the position indicated by the dotted line in fig. 5. A further movement under the influence of the spring mechanism 19 from the position indicated with the dotted line in fig. 4 to the position indicated with the unbroken lines in fig. 5 is not possible as the forked member 14 is blocked by the tooth 18. Only after the return movement of the control lever 8 is a further movement of the reversing mechanism possible under the influence of the spring 19 to the position drawn in fig. 5. During this return movement the actuating mechanism 8 is not activated. Upon reaching the position of the lever drawn in fig. 1 the hoisting cable 12, which is connected at the point 11 to the lever 8, can be tensioned and the container 2 lifted.

After the container has been moved, the control lever 8 can move under the influence of its own weight to the other end position as a result of slackening the cable 12 whereby the actuating mechanism 9 is again actuated. This results in the tooth 18 coming into contact with the forked member 14 which rotates from the position indicated in fig. 5 to the position indicated in fig. 4, with as interim position the position indicated with the dotted lines in figures 4 and 5. As a result of this the rotation actuating shaft 13 is rotated in the opposite direction as in the previous active stroke with the consequence that the locking members 7 are again rotated to the release position. During the subsequent movement under the influence of the tensioning of cable 12 to

the position of the control lever 8 drawn in fig. 1 the hoisting frame 1 is lifted from the container 2.

Should a change to manual control be required the locking member 26 can be folded upward so that the control lever 8 is blocked in the position drawn in figures 1 and 2. The rotation actuating rod 13 can then be rotated in the required direction using the manual control lever 25. The position of the manual control lever 25 can be observed at a distance by the operator on the hoisting cranes, thus achieving hereby a visual control of the operating situation.

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CLAIMS

1. A hoisting frame for gripping, coupling with and hoisting a container, consisting of at least one longitudinal beam and at least two transverse beams with downward directed locking members on the end portions of said transverse beams, which members are lockable through rotation onto matching openings in said container, and an actuating mechanism for actuating the locking members coupled with a control lever rotatable between two end positions and a coupling device accommodated in said actuating mechanism and acting in one direction, such that the rotation of said locking member in each direction occurs on a movement of said control lever towards one particular end position, wherein that particular end position is reached under the influence of the weight of the rotatable lever itself.

2. A hoisting frame as claimed in claim 1, wherein the control lever displays an attachment point for the hoisting cable.

3. A hoisting frame as claimed in claim 1 or claim 2, wherein the coupling device comprises a reversing mechanism displaying a forked member and coupled to a rotation actuating rod for the locking members, which mechanism co-acts with a rotatable fork-shaped member driven by the control lever and of which one of the teeth when rotated in one direction grips said forked member and causes it to rotate and of which the

other tooth when rotated in the same direction causes said forked member to rotate in the other direction.

4. A hoisting frame as claimed in claim 3, wherein the forked member is under bias of a bistable spring system.

5. A hoisting frame as claimed in any one of claims 3, or 4 wherein the rotation actuating rod is connected to a manual control lever for manual control.

6. A hoisting frame as claimed in any one of claims 1 to 5 wherein each locking member is connected to a cam which co-acts with a release pin arranged for vertical movement and displaying a slot for the receiving of said cam, such that said slot is situated at the same height as said cam only in the highest position of said release pin.

7. A hoisting frame as claimed in claim 6, wherein a spring tensioned locking member is utilized for locking the release pin in the highest position.

8. A hoisting frame as claimed in any one of claims 1 to 7 wherein a bistable spring system is arranged in the actuating mechanism.

9. A hoisting frame as claimed in claim 8, wherein the bistable spring system contains a gas spring.

10. A hoisting frame as claimed in any one of claims 1 to 9, wherein a locking member is utilized for

blocking the control lever.

11. A hoisting frame as substantially described in the specification and accompanying drawings.

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